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Distress Tolerance, Negative Affectivity and Effortful Control

Senior Honors Thesis

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Abstract

It has been well-established in the research literature that individuals high in negative affectivity (NA) are at risk to adopt dysfunctional means of regulating negative affective states. Recently, researchers have begun to investigate distress tolerance, one's ability to tolerate NA, as a possible construct contributing to this general tendency to avoid the experience of NA in maladaptive ways. Researchers have discovered a predictive relationship between low distress tolerance levels and poor treatment prognosis for a wide variety of psychopathology (Daughters, 2005). This study investigated the role of NA and Effortful Control (EC), the ability to self-regulate NA, as possible temperamental constructs contributing to distress tolerance. The model under investigation posits that EC will moderate the relationship between NA and distress tolerance. The sample consisted of 143 Psychology 100 students at The Ohio State University. The PASAT, a task used to induce stress, was used to measure distress tolerance levels (higher PASAT scores indicated higher distress tolerance). Generally, results did not support the proposed hypotheses. However, higher levels of EC were associated with higher PASAT scores, supporting the role of EC in PASAT performance. Overall, participants in this study did not become sufficiently stressed by the PASAT, as evidenced by the failure to find a significant relationship between NA and PASAT performance.

Distress Tolerance, Negative Affectivity, and Effortful Control

In recent years, there has been increased scientific and clinical interest regarding the maladaptive regulation of negative affectivity as a vulnerability factor in the development of various forms of psychopathology. Negative affectivity (NA) refers to a temperamental disposition characterized by high distress reactivity in response to stimuli that typically elicit fear and/or frustration (Clark, Watson, & Mineka, 1994). Individuals high in NA who have limited access to adaptive coping strategies tend to fall victim to dysfunctional self-regulation styles that can result in mental health problems. For example, individuals afflicted with Bulimia Nervosa use food intake and dieting as a means of regulating negative affective states (Anestis, Selby, Fink, & Joiner, 2007). Substance abuse is another example of psychopathology that is related to maladaptive coping strategies, for these individuals use drugs as a means of avoiding the experience of negative affectivity (Chaney, Roszell, & Cummings, 1982; Otto, Powers, & Fischmann, 2005).

Individuals who do not engage in such behavioral maladaptive regulatory strategies to avoid the experience of negative affect may instead engage in other maladaptive self-regulatory processes with primarily cognitive components. For instance, the excessive worry adopted by individuals with Generalized Anxiety Disorder may be a way of reducing the experience of negative affective states and anxious sensations, since the negative cognitions about future events serve as a distraction from negative emotional experience and unwanted somatic responses (Decker, Turk, Hess, & Murray, 2008). Also, the rumination or excessive negative cognition about previous experiences observed in depressed patients may provide a similar distraction from negative emotionality (Zvolensky & Otto, 2007). Overall, recent empirical evidence has shown that utilizing dysfunctional regulatory strategies as a method of attenuating

or avoiding negative affective states spans across psychopathologies, penetrating diagnostic categories.

Due to the involvement of the maladaptive regulation of affective states in many forms of psychopathology, researchers have begun to investigate possible constructs underlying this general propensity to partake in maladaptive experiential avoidance strategies. One possible contributor to dysfunctional affective regulation styles is an inability to tolerate negative emotions. In fact, recent research has focused on the tendency for individuals who adopt maladaptive regulatory styles to exhibit a low tolerance of negative affective states (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004; Gratz, 2007; Zvolensky, Otto, 2007). For instance, Daughters (2005) examined the relationship between persistence on a psychological stressor task and early treatment dropout in a residential substance abuse treatment facility. The psychological stressor task used in Daughters (2005) was the Paced Auditory Serial Addition Task (PASAT), a computer task used to induce psychological distress. The PASAT was used to measure an individual's distress tolerance level, defined as one's ability to persist in the face of psychological stress. In other words, distress tolerance refers to an ability to tolerate negative affective states. Results indicated that low distress tolerance levels predicted premature treatment dropout. Thus, those participants with a low ability to tolerate negative affective states were more likely to quit the program prematurely and, presumably, return to their maladaptive regulatory strategy. Several other studies involving nicotine addiction, pathological gamblers, and individuals with dysregulated eating behaviors have also shown low distress tolerance levels to be predictive of poor prognosis in recovery from psychopathology (Anestis et al, 2007; Brown, Lejuez, Kahler, & Strong, 2002; Daughters, Lejuez, Strong, Brown, Breen, Lesieur,

2005). Overall, there is ample evidence to support the notion that distress intolerance is a possible contributor to the maintenance of maladaptive affective regulation styles.

Even though a predictive relationship between low distress tolerance levels and poor recovery from various psychopathologies and addictive behaviors has been well established in the research literature, the mechanisms responsible for this relationship are not sufficiently understood. In other words, in light of recent research displaying distress intolerance as a risk factor for the maintenance of pathological affective avoidance strategies, further investigation is needed to identify the possible temperamental constructs contributing to one's ability to tolerate psychological distress. It is likely that not everyone who is distress prone (i.e., high in negative affectivity) is equally likely to be intolerant of distress such that they adopt maladaptive strategies to avoid distress. What aspects of an individual's personality make him/her more susceptible to be intolerant of distress beyond his/her reactive tendency to experience high levels of distress? This study will explore the possibility that temperamental differences in the capacity for effortful self-regulation (i.e., Effortful Control [EC]) are also correlates of distress tolerance. Effortful Control refers to an ability to mobilize higher-order executive control processes to inhibit reactive tendencies and replace maladaptive thoughts and behaviors with responses that are better suited for accomplishing one's goals (Posner & Rothbart, 2000; Derryberry & Reed, 2002; Davidson & Irwin, 1999). In more simple terms, EC is characterized by an ability to regulate and control reactive emotional responses in an adaptive manner. So, for example, a distress-prone individual with high EC will be less likely to adopt maladaptive experiential avoidance strategies because he/she has sufficient self-regulatory capacity to support effortful substitution of more adaptive responses (e.g., persisting in an aversive task despite a reactive urge to escape as a means of reducing distress).

The temperamental construct of EC has been repeatedly shown to be negatively correlated with symptoms of various forms of psychopathology; moreover it is a significant moderator of the relationship between temperamental constructs such as NA and such symptoms (Lonigan and Phillips, 2001; Muris, 2006; Lonigan, Vasey, Phillips, & Hazen, 2004). So, individuals with high levels of EC or an increased ability to regulate their emotions in an adaptive manner, show decreased pathological symptomology despite similar levels of reactive risk (e.g., high levels of NA). Given this evidence of EC as a modifier, in combination with the empirically established role of distress intolerance in the maintenance of psychopathologies characterized by maladaptive self-regulation, it is reasonable to propose that EC, along with NA, may influence one's ability to tolerate psychological distress. The aim of this study was to establish that low levels of distress tolerance are associated with low levels of EC as well as high levels of NA. Moreover, this study tested the hypothesis that EC will be a moderator of the association between NA and distress tolerance levels. Thus, at high levels of NA, distress tolerance will be greater for individuals with higher levels of EC versus those with lower levels. Low levels of EC combined with high levels of NA will be associated with the lowest levels of distress tolerance. Consistent with past research, distress tolerance levels were determined based upon PASAT Score on the third level, with higher PASAT Scored indicating a higher level of distress tolerance.

Due to the importance of adaptive emotion regulation strategies in the sustenance of a healthy psychological state, it would be useful to establish early detection devices of youth at risk to develop maladaptive affective regulation styles and subsequent pathological psychological states. Ideally, the youth identified as at risk could learn adaptive ways of regulating unwanted affective states before they become symptomatic of psychopathology in

adulthood. Solidifying the role of EC in distress tolerance levels is a key step toward the establishment of behavioral distress tolerance measures as legitimate indexes of future psychopathology, for, an empirical validation of a link between EC (a temperamental construct intricately involved in the development of psychopathology) and one's ability to tolerate distress would make distress tolerance a more viable candidate to predict the onset of psychopathology. After a link between EC and distress tolerance levels has been well-established, researchers may begin evaluating the possibility of behavioral distress tolerance measures, such as the PASAT, as a means of detecting youth at risk to adopt dysfunctional self-regulatory styles. These vulnerable individuals could then be taught the adaptive self-regulatory processes utilized by individuals high in EC in order to prevent pathological symptomology later in life. This would be a big step in the prevention of psychopathology; for, as previously stated, maladaptive emotional regulatory styles are implicated in a wide variety of psychological disorders.

Method

Participants

Participants for this study included 143 individuals pre-selected from a pool of 498 Psychology 100 students attending The Ohio State University. These 143 individuals were selected to participate based upon their levels of NA and EC. NA was assessed based upon answers to an abbreviated version of the PANAS (T-PANAS; Watson, Clark, & Tellegen, 1988). EC levels were determined based upon subjects' answers to two self-report questionnaires. The first questionnaire was a short-version of the ACS, which included a subset of scales measuring an individual's ability to focus his/her attention (ACS; Derryberry & Reed, 2002). The second questionnaire was a short-version of the ECS, which contained a subset of persistence measures (ECS; Lonigan, 1998). All individuals whose NA scores fell in the upper or lower quartiles and

those whose EC scores fell in the upper or lower quartile were invited to participate in the study. The threshold for being considered an extreme score was decided based upon the cut-off point for placing in the upper or lower quartile for NA and EC as determined by previous studies using the same measures. Simultaneously, a random sample of all others who completed the prescreening were also invited to participate. The goal of this procedure was to maximize variability on the constructs of interest. The distribution of NA and EC scores for the resulting sample closely approximated normality. The final sample consisted of 143 individuals. The mean age of the sample was 19.2 years with 95% of the individuals between the ages of 18 and 22, inclusively; 61.3% were women; 85.2% were Caucasian, 5.6% were Asian American, and 2.1% were African American.

Measures

The Adult Temperament Questionnaire Short Form (ATQshort). Negative Affectivity and Effortful Control will be assessed using the ATQshort (Derryberry and Rothbart, 1988). The ATQshort is a self-report questionnaire used to assess individual differences in the general constructs of effortful control, negative affectivity, extraversion, and orienting sensitivity. It consists of 77 item subscales in which the participant is asked to rate a statement from 1 (extremely untrue of you) to 7 (extremely true of you). For the purposes of this experiment, only those items assessing individual levels of Effortful Control and Negative Affectivity will be scored. An example of an item measuring Negative Affectivity: "I become easily frightened." An example of an item measuring Effortful Control: "When I am trying to focus my attention, I am easily distracted." Both scales have been shown to possess adequate psychometric properties (Derryberry and Rothbart, 1988).

Affect Rating Scales. Participants were asked to complete affect rating scales directly before and after PASAT administration. The ratings presented before the PASAT were administered on a computer screen. The same ratings were presented after the PASAT in paper form. These ratings assessed each participant's current affective state. The affect scales were administered in the form of a 10cm visual analogue in which participants were asked to mark a place on the line that best indicated the degree to which they were currently experiencing a particular affective state. The scale ranged from none to extreme. The following affective states were assessed: Anxiety, Irritation, Frustration, Difficulty Concentration, Happiness, and Bodily Discomfort. The Affect Rating Scales were scored by measuring the distance (millimeters) from the far left of the scale to the point at which the participant marked the scale. Scores ranged from 0 to 100.

PASAT Effort Rating. Following PASAT administration, participants were asked to estimate how much effort they exerted to complete the PASAT. The scale ranged from 0 (No Effort) to 8 (Extreme Effort)

Materials

Paced Auditory Serial Addition Task (PASAT). Distress Tolerance levels were assessed using a computer task called the PASAT (PASAT; Daughters, 2005). The PASAT is a behavioral measure of distress tolerance. The task is designed to induce psychological distress. In this computer task, numbers were sequentially flashed on a computer screen, and participants were asked to add each number to the number that occurred previously. Participants indicated the sum by clicking on one of twenty boxes labeled 1 through 20. Each time a participant

clicked the correct added amount, he/she received a designated number of points. A running total of each participant's point level was displayed at the top right of the computer screen.

The PASAT consisted of three levels. In the first level, the latency between number presentations was three seconds, and the level lasted for three minutes. In the second level, the latency between number presentations was two seconds, and the level lasted for 5 minutes. In the third and final level, the latency between number presentations was one second. This level was particularly challenging, and the subjects were told that they could terminate the task at any time by clicking an "I quit" button located at the bottom of the screen. If the participant did not hit the button within ten minutes, the task terminated on its own. The subjects were not told that the task was scheduled to end after ten minutes. Participants were also asked to wear headphones through which they heard an explosion sound upon failure to indicate the correct added amount within the time period allotted by each level. The volume level of the headphones was preset in order to avoid any discrepancies in decibel level from participant to participant. The purpose of the explosion sound was to provide an additional distraction, and therefore, and additional source of distress. In previous experiments using the PASAT, each participant's distress tolerance level was determined by latency to termination on the last level (Brown, 2002).

PASAT Payment: In order to encourage proper engagement in the task, participants were told prior to PASAT administration that they would be paid based upon their PASAT performance. Specifically, subjects were told that they would receive $5 if they scored higher than the average participant in the study.

Procedure

Data for this study were collected as part of a larger prospective study. All portions of the study were completed within lab rooms in the Psychology Building on campus. I will only review the portions of the procedure pertinent to this study. The 143 participants selected from the prescreening pool were asked to attend three data collection sessions. In the first session, informed consent was obtained from participants. Afterward, graduate students and undergraduate research assistants administered a packet of questionnaires containing the ATQshort as well as a battery of questionnaires unrelated to this study. The research assistants dictated general instructions about the questionnaires in addition to answering any specific questions about the instructions. Two or three weeks after the initial data collection session, participants returned to complete the second session. During this session, research assistants read aloud to all participants specific, typed directions about how to properly complete the PASAT. Before beginning the PASAT, participants were asked to complete various Affect Rating Scales on the computer. Following PASAT administration, participants were asked to complete the same Affect Rating Scales, along with a PASAT Effort Rating form. Two or three weeks after the second session, participants returned for the third and final data collection session. After completing a battery of questionnaires unrelated to this study, the participants were given any performance-based payment they acquired. Also, the participants were debriefed about the study.

Results

Descriptive Statistics and Preliminary Analyses

The mean scores and standard deviations of the ATQshort for Negative Affectivity and Effortful Control are shown in Table 1. The mean scores and standard deviations for the Affect Rating Scales and the PASAT Effort Rating are also shown in Table 1.

Table 1 also contains the mean scores and standard deviations for PASAT Quit time and PASAT Score on the third level. Due to technical difficulties and unscheduled interruptions during the PASAT, data were lost or discarded for 5 subjects. Individuals persisted on the third level of the PASAT for an average of 450.21 seconds, with 63% of subjects persisting the full 600 seconds. In comparison to other research using the PASAT as a distress tolerance measure, subjects in this study persisted surprisingly long. For example, the subjects in Daughters (2005) only persisted an average of 208.7 seconds in contrast to the average persistence of 450.21 seconds in this study. As a result, the distribution of PASAT Quit time scores was excessively skewed to the right, as shown by Figure 1. The skewness present in the PASAT Quit time distribution resulted in difficulty when attempting to analyze it as a continuous dependent variable. This skewness problem did not allow PASAT Quit time to serve as a variable indicating distress tolerance level as in previous studies. Therefore, PASAT Score on the third level was selected as the primary dependent variable representing distress tolerance levels. PASAT Score 3 seemed to be an appropriate second choice since it was highly correlated with PASAT Quit time ($tau = .60$, $p < .01$). Participants scored an average of 46.01 points on the third level of the PASAT, with the lowest possible score being zero and the highest possible score being 162.

Main Analyses

Correlations

All reported regression and correlation analyses were performed without data from subjects 134 and 14, as both participants were determined to be high influence outliers. The decision to remove subjects 134 and 14 from the data pool is notably controversial, however, a comparative analysis of residuals showed both subjects to have far greater influence on the slope of the regression line than any other subject in the study, which proved them worthy candidates for exclusion from analysis. All correlations between variables are included in Table 2. One notable significant correlation was found between EC and distress tolerance as measured by PASAT Score 3 ($p<.05$).

Hierarchical Regression Analyses

NA, EC, and NA x EC predicting PASAT Score 3

The hypothesized NA x EC interaction predicting distress tolerance was tested by hierarchical regression analysis. This analysis included the dichotomous variable gender along with the continuous variables NA, EC, and NA x EC. The NA x EC interaction term was computed from the standardized variables NA and EC. Gender, z-NA, and z-EC were entered as main effects in Step 1. The interaction term NA x EC was entered in Step 2.

As shown by Table 3, results indicate that the NA x EC interaction term did not produce significant results. Furthermore, the main effects of z-NA and z-EC were also not significant. However, Gender did significantly predict PASAT Score 3 ($p<.05$). Being a male predicted better PASAT Scores on the third level.

NA, EC, and NA x EC predicting Change in Anxiety Rating from Pre to Post PASAT

Hierarchical regression analysis was also used to evaluate the NA x EC interaction predicting change in anxiety ratings from pre to post PASAT. The main effects gender, z-NA, and z-EC were entered in Step 1. Anxiety ratings before the PASAT were controlled for by entering pre-PASAT anxiety rating as a variable in Step 1. The interaction term NA x EC was entered in Step 2.

As shown by Table 4, results indicate that the NA x EC interaction term, once again, did not produce significant results. However, the main effects z-NA and z-EC significantly predicted change in anxiety from pre to post PASAT ($p<.05$).

NA, EC, and NA x EC predicting Change in Concentration Difficulties Rating from Pre to Post PASAT

Hierarchical regression analysis was also used to evaluate the NA x EC interaction predicting change in concentration difficulties ratings from pre to post PASAT. The main effects gender, z-NA, and z-EC were entered in Step 1. Concentration Difficulties ratings before PASAT administration were controlled for by entering pre-PASAT concentration difficulties as a variable in Step 1. The interaction term NA x EC was entered in Step 2.

As shown by Table 5, the NA x EC interaction term did not produce significant results. However, there was a main effect, as z-EC significantly predicted change in concentration difficulties from pre to post PASAT ($p<.05$).

NA, EC, and NA x EC predicting PASAT Effort Rating

Hierarchical regression analysis was used to evaluate the NA x EC interaction predicting PASAT effort rating. The main effects gender, z-NA, and z-EC were all entered in Step 1. The interaction term NA x EC was entered in Step 2.

As shown in Table 6, the NA x EC interaction did produce significant results ($p<.05$). . This is shown by the significant change in R^2 from Step 1 to Step 2. This was the only regression analysis where the interaction term significantly predicted the dependent variable. The main effect z-NA also significantly predicted PASAT Effort rating ($p<.05$). Results are depicted in Table 2.

Discussion

In the current study, the relationship between NA, EC, and distress tolerance was examined. The predicted hypothesis that EC would moderate the relationship between NA and distress tolerance such that individuals higher in NA would be more tolerant of distress at high levels of EC versus low levels of EC was not supported by results. Furthermore, there were few associations between levels of NA and various measures of PASAT performance. NA uniquely predicted change in anxiety ratings from pre to post PASAT. EC produced more significant effects, EC was particularly related to changes in ratings of anxiety and difficulty concentrating from pre to post PASAT. Also, EC was significantly correlated with PASAT score on the third level. Although the NA x EC interaction generally produced nonsignificant results, the NA x EC interaction predicting PASAT Effort rating was significant. Specifically, individuals low in EC rated the PASAT as difficult regardless of levels of NA while those high in EC only rated the

task as difficult at high levels of NA. Finally, there was a main effect of gender predicting PASAT performance such that being a male predicted better scores on the third level of the task.

Results suggest that EC was a significant factor in determining PASAT performance. In particular, the significant correlation between levels of EC and PASAT Score 3 showed high levels of EC to be associated with higher scores on the third level of the task, which suggests that temperamental differences in the capacity for effortful self-regulation played a role in participants' ability to persist and perform on the most challenging level. Moreover, the EC main effects for affect ratings lend support to the theory that the adaptive coping mechanisms in EC help attenuate negative affective reactions, since individuals higher in EC showed less of an increase in anxiety from pre to post PASAT.

Further support for the role of EC in PASAT performance comes from the significant NA x EC interaction predicting PASAT Effort Ratings. These results show that without ample EC resources (e.g. low EC), participants rated the PASAT as difficult regardless of their levels of distress reactivity. Individuals with high EC found the PASAT to be challenging only if they were also high in NA, suggesting that susceptibility to negative affective reactions (e.g., frustration, irritation, anxiety) during the task made it more challenging. For example, in addition to exerting executive control processes in order to correctly add numbers within a second's time, the individual was also using effortful control resources to regulate his/her heightened negative affective state. Presumably, this inordinate taxing of EC resources caused participants to rate the task as more challenging. Overall, these results suggest that sufficient self-regulatory capabilities were an important tool for participants when completing the PASAT since the task was rated as very difficult when EC resources were depleted.

The Gender main effect predicting PASAT Score 3 was both largely significant and surprising. This finding showed that being a male predicted better PASAT performance on the third level. Although it is difficult to surmise why this gender effect occurred, one possible explanation is increased video game usage in the male population. Perhaps increased usage of video games allow for heightened reaction times or attentional focus during these types of tasks.

The failure to find any significant relationship between NA and most measures of PASAT performance suggests that the PASAT may not have been very distressing for participants in this study. Previous studies have found similar results in regards to the relationship between NA and PASAT performance. For example, Daughters (2005) also failed to find a significant relationship between NA and PASAT persistence. During the discussion of this finding, Daughters (2005) emphasized that even though NA clearly plays a role in distress tolerance, it is one's ability to persist despite negative affective reactions that primarily influences distress tolerance levels. Since persistence is one facet of EC, Daughters (2005) appears to be suggesting that EC is the primary contributor to distress tolerance. Results from this study lend some support to this theory, as EC was significantly correlated with PASAT Score 3 while NA was not. However, it is vital to note that in this study, unlike Daughters (2005), the PASAT failed to sufficiently stress participants. This failure is evidenced by how long participants persisted on the third level of the PASAT in this study (450.21s) compared to other studies using the same version of the task, such as Duaghters (2005), where participants persisted for a much shorter period of time (208.7s). Overall, the failure to find a relationship between NA and PASAT performance, in combination with the failure of participants to become sufficiently stressed, suggests that the PASAT was not an adequate measure of distress tolerance

in this study. For, in order for a task to be an adequate measure of one's ability to tolerate distress, the task must first be able to induce a certain amount of distress.

One possible explanation as to why the PASAT was not challenging enough for participants in this study is due to the nature of the sample. More specifically, this study was the first to use the PASAT as a measure of distress tolerance on non-clinical populations. Previous studies administered the PASAT to populations of individuals clinically diagnosed with psychopathology. So, it is possible that the PASAT was quite distressing for an individual afflicted with heroin addiction, but was only minimally distressing to the average college student, who, by way of getting into college, has already proven a certain ability to persist through distressing situations. Moreover, a key characteristic of the psychopathologies explored in previous studies is the adoption of maladaptive experiential avoidance strategies to regulate negative affectivity (e.g. drug abuse). So, when stressed, these individuals will use any means possible to escape the situation. In the case of the PASAT, drug abusers, for instance, without the comfort of their behavioral avoidance strategy, would probably quit early on the third level to avoid the experience of negative affect. On the other hand, college students likely do not have such intense experiential avoidance issues, so the impulse to avoid any experience of negative affect on the third level would not be as prevalent. In conclusion, due to the absence of any pervading psychopathology in the current study, it is probable that subjects did not become as easily distressed by the PASAT. Furthermore, in comparison to the other studies using clinical populations, the subjects in this study likely had fewer factors such as experiential avoidance impulses hindering their ability to persist.

Another possible explanation for the excessive persistence exhibited by subjects in this study is a failure of participants to remain sufficiently engaged in the task. It reasonable to

propose that some participants maintained the illusion of persistence on the third level by not clicking the "I quit" button despite having disengaged from the task fairly quickly. Indeed, results support this theory given the wide range of scores observed in those individuals who persisted the entire 600 seconds on the last level. Scores among such individuals ranged from 3 to 148. Disengagement from the task on the final level would be a major detriment to the accurate assessment of persistence on the PASAT, since this would prevent participants from becoming as distressed. For, if participants are not focused on the task and are not putting forth effort to correctly add the numbers, there is less room for them to become frustrated or anxious upon failure to achieve the correct answer. Such disengagement from the task may be particularly problematic because it may reflect different influences across participants. Some may have disengaged as an affect regulation strategy. If that were the only path to disengagement then PASAT score would be expected to reflect the influence of NA. However, other participants may have disengaged due to lack of motivation and thereby may have obscured any relationship between NA and PASAT score.

Future studies attempting to examine the role of NA and EC in distress tolerance by utilizing the PASAT should make a few key adjustments to the current study. Firstly, if the PASAT is going to be administered to non-clinical populations, it would be wise to make the task more challenging. For example, more difficult arithmetic or less latency between number presentation are a couple ways that the difficulty level of the task may be increased. In addition, replacing the "I quit" button with an "End Task" or "Stop" button may abate any undue influence of the "I quit" button on more conscientious populations. More specifically, clicking the "I quit" button may mean something quite different to a college student than it does to a person in a rehab facility for drug abuse. Presumably, college students (who must be fairly motivated to succeed

given that they have been accepted to college) would be more averse to accepting an explicit indicator of failure, such as welcoming the label of "quitter". So, requiring college students to click the "I quit" button in order to end the PASAT may have an exaggerated influence on the participant's decision to continue persisting.

Future researchers should also make an effort to ensure that participants are properly engaged while completing the PASAT, perhaps by making participants feel as though they have something to lose if they do not perform well on the task. For instance, telling subjects that the PASAT is a measure of intelligence would be a good way to assure some sort of personal investment in performance. Finally, future studies would likely have more success in assessing the relationship between NA, EC and distress tolerance if they include more subjects at the extreme ends of the distributions of NA and EC. In fact, it would be ideal to run this experiment only using subjects who fit into one of the following four groups: (1) Low EC, High NA (2) Low EC, Low NA (3) High EC, High NA (4) High EC, Low NA. Aside from likely producing more variation in PASAT persistence, having subjects divided in the four aforementioned groups will facilitate analyses of the effect of high and low levels of NA and EC on distress tolerance.

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Table 1 Descriptive Statistics

	N	*Min*	*Max*	*M*	**(SD)**
Negative Affect	143	34	156	104.55	23.27
Effortful Control	143	31	133	84.14	15.64
PASAT Quit time	138	2	600	450.21	225.97
PASAT Score 3	137	0	162	46.01	36.50
Anxiety Pre-PASAT	137	1	100	19.85	21.76
Concentration Difficulty Pre-PASAT	137	1	100	22.55	21.81
Anxiety Post-PASAT	136	1	100	36.78	27.82
Concentration Difficulty Post-PASAT	137	1	100	39.91	29.87
PASAT Effort	124	0	8	6.34	1.42
Percent Female			61.3		

Table 2 Correlations between all variables

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	**9**
1. Negative Affect	-								
2. Effortful Control	-.490**	-							
3. PASAT Quit time	-.064	.151	-						
4. PASAT Score 3	-.145	.199*	.667**	-					
5. Anxiety Pre-PASAT	.389**	-.141	.031	.030	-				
6. Concentration Difficulties Pre-PASAT	.398**	-.282**	.057	-.022	.459**	-			
7. Anxiety Post-PASAT	.452**	-.341**	-.015	-.072	.532**	.378**	-		
8. Concentration Difficulties Post-PASAT	.355**	-.365**	-.012	-.129	.337**	.520**	.655**	-	
9. PASAT Effort Rating	.221*	-.143	.149	.135	.228*	.240*	.263**	.270**	-
10. Gender	.310**	-.150	-.055	-.317**	.130	.027	.188*	.106	.045

*p<.05 **p<.01

Table 3 *Hierarchical Regression Analysis Results for NA x EC Predicting PASAT Score 3*

	B	*SE*	*Beta*	R^2	**R^2 Change**
Step 1				.119	.019
Constant	60.030	4.941			
Gender	-22.316**	6.473	-.299**		
z-NA	.985	3.676	.026		
z-EC	5.978	3.768	.148		
Step 2				.123	.004
NA x EC	-2.366	3.136	-.063		

Note: z-NA=Standardized Negative Affect; z-EC=Standardized Effortful Control
*p<.05**p<.01

Table 4 *Hierarchical Regression Analysis Results for NA x EC Predicting Change in Anxiety Ratings Pre and Post PASAT*

	B	*SE*	*Beta*	R^2	**R^2 Change**
Step1				.198	.198***
Constant	24.240	3.698			
Gender	2.735	4.169	.055		
AnxPre	-.450***	.097	-.397***		
z-NA	5.433*	2.531	.213*		
z-EC	-5.124*	2.444	-.189*		
Step 2				.204	.006
NA x EC	-1.916	2.035	-.076		

Note: z-NA=Standardized Negative Affect; z-EC=Standardized Effortful Control; AnxPre=Anxiety Rating Pre-PASAT

*p<.05 **p<.01 ***p<.001

Table 5 *Hierarchical Regression Analysis Results for NA x EC Predicting Change in Concentration Difficulties Ratings Pre and Post PASAT*

	B	*SE*	*Beta*	R^2	**R^2 Change**
Step 1				.133	.133**
Constant	25.139	4.475			
Gender	2.281	4.658	.043		
ConPre	-.411***	.109	-.342***		
z-NA	2.279	2.784	.084		
z-EC	-6.372*	2.711	-.220*		
Step 2				.141	.008
NA x EC	2.442	2.238	.090		

Note: z-NA=Standardized Negative Affect; z-EC=Standardized Effortful Control; ConPre=Concentration Difficulties Rating Pre-PASAT
*p<.05 **p<.01 ***p<.001

Table 6 *Hierarchical Regression Analysis Results for NA x EC Predicting PASAT Effort Rating*

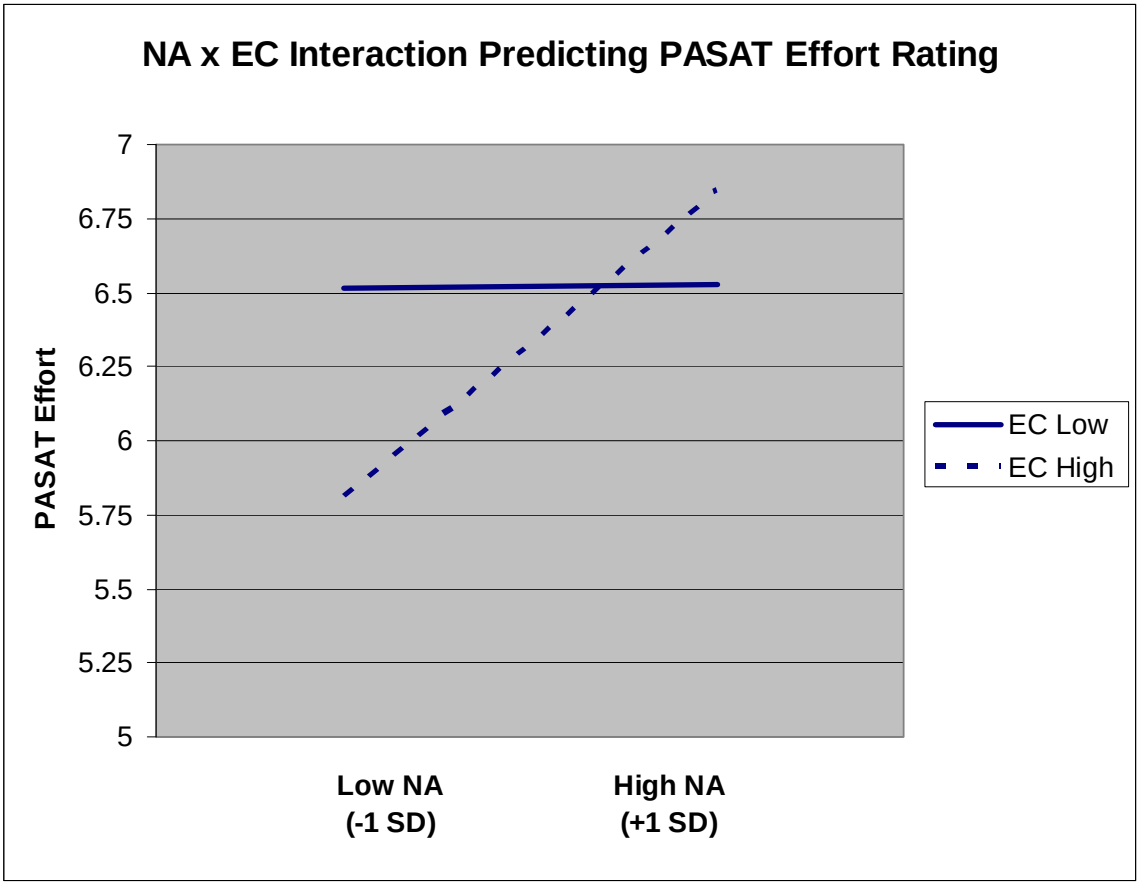
	B	*SE*	*Beta*	R^2	**R^2 Change**
Step 1				.052	.050*
Constant	6.374	.212			
Gender	-.083	.277	-.028		
z-NA	.307*	.157	.207*		
Z-EC	-.079	.162	-.049		
Step 2				.083	.031*
NA x EC	.255*	.128	.179*		

Note: z-NA=Standardized Negative Affect; z-EC=Standardized Effortful Control
*p<.05

Figure Captions

Figure 1. NA x EC interaction for PASAT effort rating.

Figure 1.


NA x EC Interaction Predicting PASAT Effort Rating
PASAT Effort
7
6.75
6.5
6.25
6
5.75
5.5
5.25
5
Low NA
(-1 SD)
High NA
(+1 SD)
EC Low
EC High